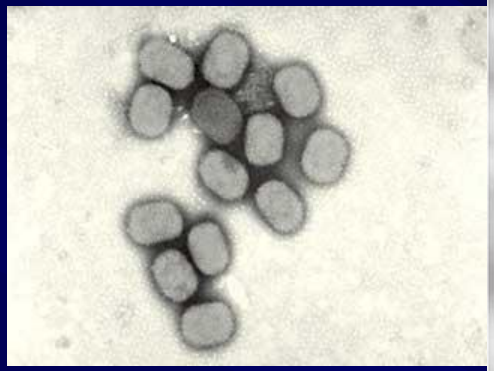
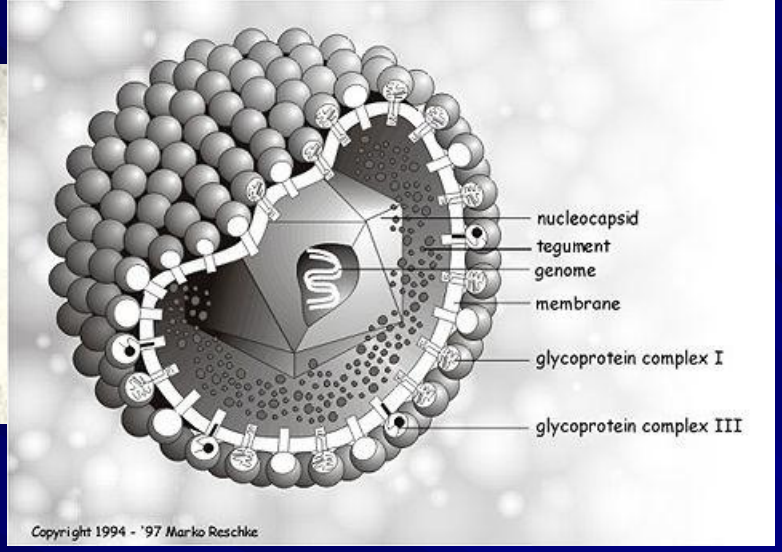
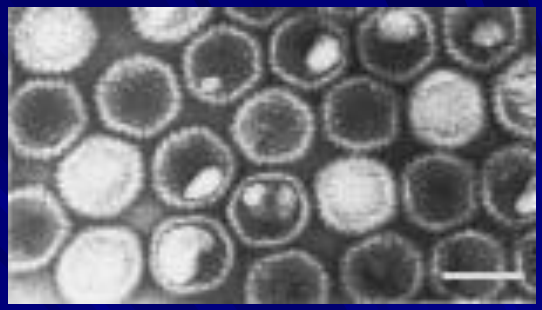
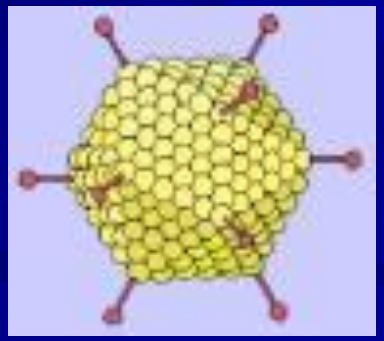


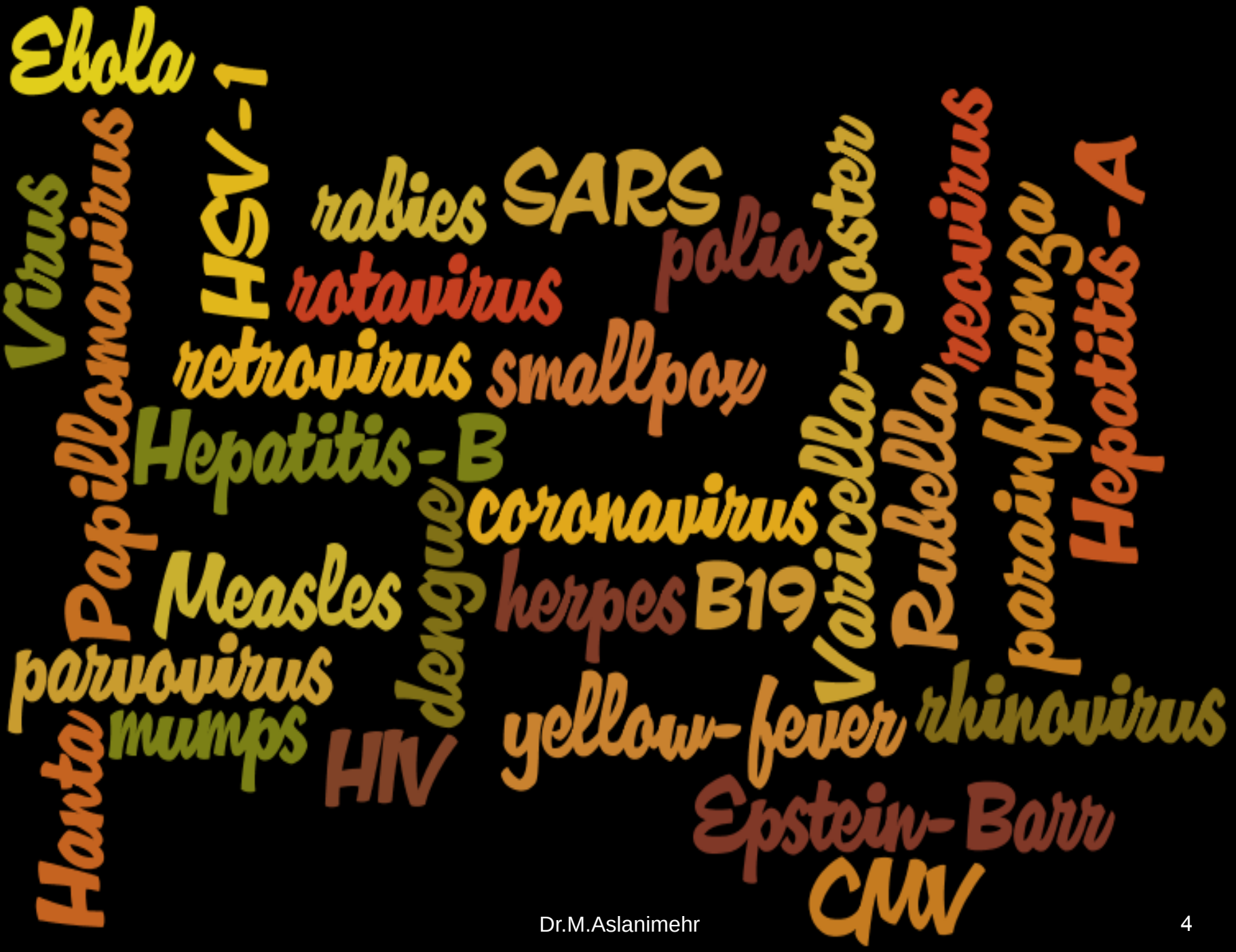


# Clinical Virology
# By : Dr M.Aslanimehr



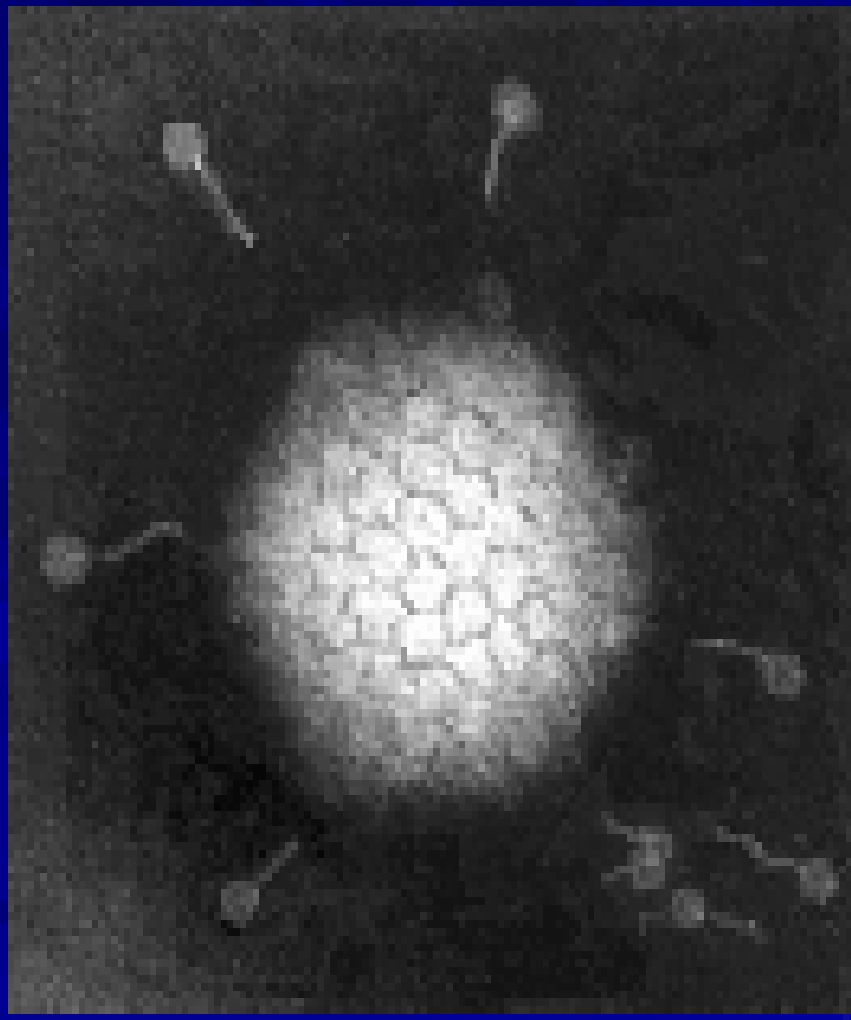

بسم الله الرحمن الرحیم


Ebola
Virus
Papillomavirus
HSV-1
rabies
SARS
rotavirus
polio
retrovirus
smallpox
Hepatitis-B
coronavirus
dengue
Measles
herpes
B19
Varicella-zoster
Rubella
reovirus
parainfluenza
Hepatitis-A
parvovirus
Hanta
mumps
HIV
yellow-fever
rhinovirus
Epstein-Barr
CMV

# BASIC VIROLOGY

Dr. M. Aslani Mehr

PhD. of Clinical Microbiology



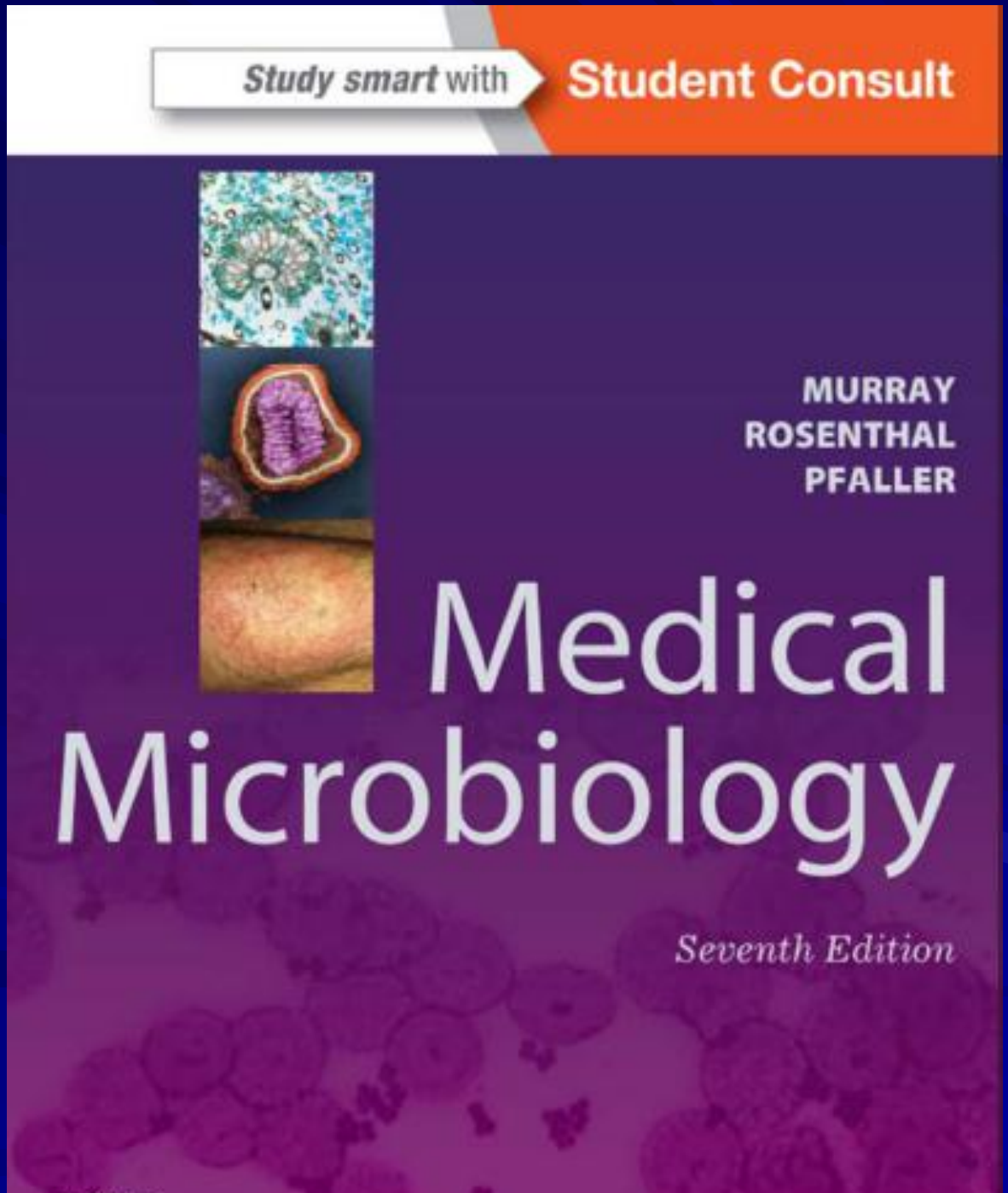
# REFRENCES

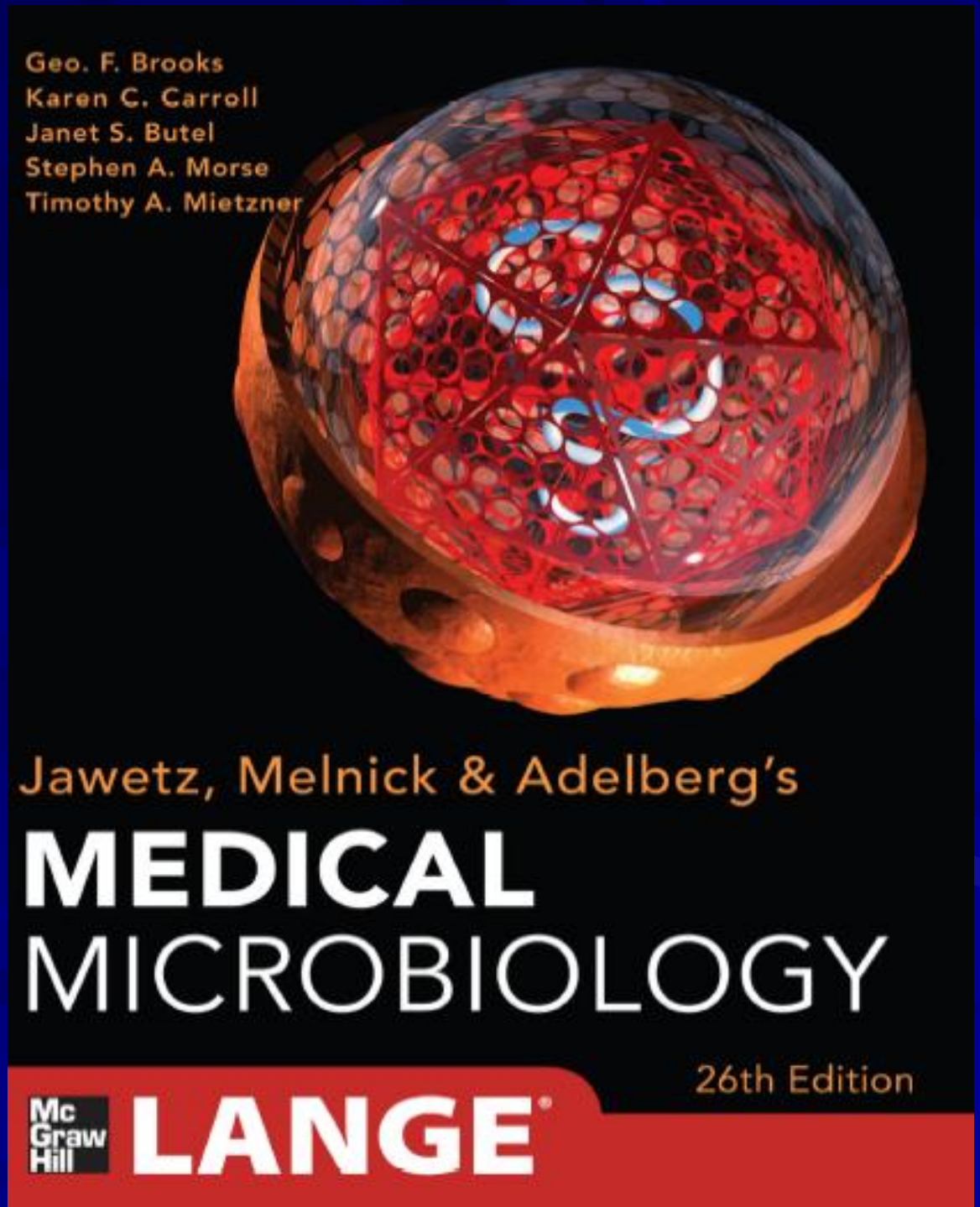

1. ***Javetz, Melnick & Adelberg's Medical Microbiology***
***Geo. F. Brooks, Janet S. Butel, Stephen A. Morse . 2013***

2. ***Medical Microbiology***
***Murray , 2016***

3. ***Review & Board Examination Of Medical Microbiology***
***E. Jawetz , R. Lewinson . 10th edition (2008)***

4. ***Fields Virology***
***latest ed. ( 2014)***


Study smart with Student Consult
MURRAY
ROSENTHAL
PFALLER
Medical Microbiology
Seventh Edition


Geo. F. Brooks
Karen C. Carroll
Janet S. Butel
Stephen A. Morse
Timothy A. Mietzner
Jawetz, Melnick & Adelberg's
MEDICAL
MICROBIOLOGY
26th Edition
Mc Graw Hill
LANGE

# You Need Study Viruses & Virology Because :

- The viral infections are very important in 21. century.

Why?

??????????????

# Because :

- Many New & Re Emergence Diseases are Viral
- ……
- ……..
- …….

# عفونت های نوپدید طی  سال های اخیر

TABLE 4-1 **Some Recently Recognized Disease/Microorganism Associations**

| Year* | Microorganism | Disease |
|---|---|---|
| 1970 | Coxsackievirus | Hand-foot-and-mouth disease |
| 1972 | Norwalk virus | Gastroenteritis |
| 1973 | Rotavirus | Infantile diarrhea |
| 1975 | Astrovirus | Gastroenteritis |
| 1975 | Parvovirus B19 | Fifth disease; aplastic crises–chronic hemolytic a |
| 1976† | Ebola virus | Ebola hemorrhagic fever |
| 1977 | *Cryptosporidium parvum* | Acute enterocolitis |
| 1977 | Enteric adenovirus | Gastroenteritis |
| 1977 | Hantaan virus | Hemorrhagic fever with renal syndrome |
| 1977 | Hepatitis D virus | Hepatitis D (bloodborne) |
| 1977 | *Legionella pneumophila* | Legionnaires disease |
| 1981 | *Staphylococcus aureus* | Toxic shock syndrome associated with tampons |
| 1982 | *Escherichia coli* O157:H7 | Hemorrhagic colitis; hemolytic uremic syndrome |
| 1983 | *Helicobacter pylori* | Gastric ulcers |
| 1983 | HIV type 1 | HIV disease; HIV infection and AIDS‡ |
| 1987 | Hepatitis E virus | Hepatitis E (waterborne, food-borne) |
| 1987 | Rift Valley fever virus | Hemorrhagic fever |
| 1988 | Human herpesvirus 6 | Roseola (actual disease known since 1910) |
| 1989 | *Ehrlichia chaffeensis* | Human ehrlichiosis |
| 1989 | Hepatitis C virus | Hepatitis C (bloodborne) |
| 1990 | Barmah forest virus | Polyarthritis in West Australia |
| 1990 | *Haemophilus influenzae* | Brazilian purpuric fever (new strain: aegyptius) |

| | | |
|---|---|---|
| 1991 | *Guanarito* virus | Venezuelan hemorrhagic fever |
| 1991 | Hepatitis F virus | Hepatitis |
| 1992 | *Bartonella henselae* | Cat-scratch disease |
| 1992 | *Vibrio cholerae* 0139 | Epidemic cholera (new strain) |
| 1993 | Sin nombre virus | Hantavirus pulmonary syndrome |
| 1994 | Sabia virus | Brazilian hemorrhagic fever |
| 1995 | Hepatitis G virus | Hepatitis G |
| 1995 | Human herpesvirus 8 | Associated with Kaposi sarcoma |
| 1995 | Alkhurma virus | Hemorrhagic fever |
| 1996 | Australian bat lyssavirus | Paralysis, delirium, convulsions |
| 1998 | Hendra virus | Respiratory disease |
| 1998 | Menangle virus | Respiratory disease |
| 1998 | Nipah virus | Meningitis, encephalitis |
| 1999 | West Nile virus | Encephalitis |
| 2003 | Coronavirus | Severe acute respiratory syndrome (SARS) |
| 2003 | Monkeypox virus | Skin infection |
| 2004 | Torque teno virus | Acute respiratory disease |
| 2005 | Chikungunya virus | Polyarthralgia |
| 2009 | Saffold virus | Infects the myocardium and central nervous syste |
| 2009 | SFTS bunyavirus | Thrombocytopenia and fever |
| 2012 | Novel coronavirus | Respiratory syndrome with renal failure |

*Year microorganism was isolated, identified, or first associated with disease.
†Subsequent outbreaks have occurred in 1979, 1994, 1995, 1996, 2001, and 2007.
‡HIV, human immunodeficiency virus; AIDS, acquired immunodeficiency syndrome.

# مثال ها و دلایل ظهور عفونت های نوپدید ویروسی

**TABLE 4-2 Causes and Examples of Disease Emergence**

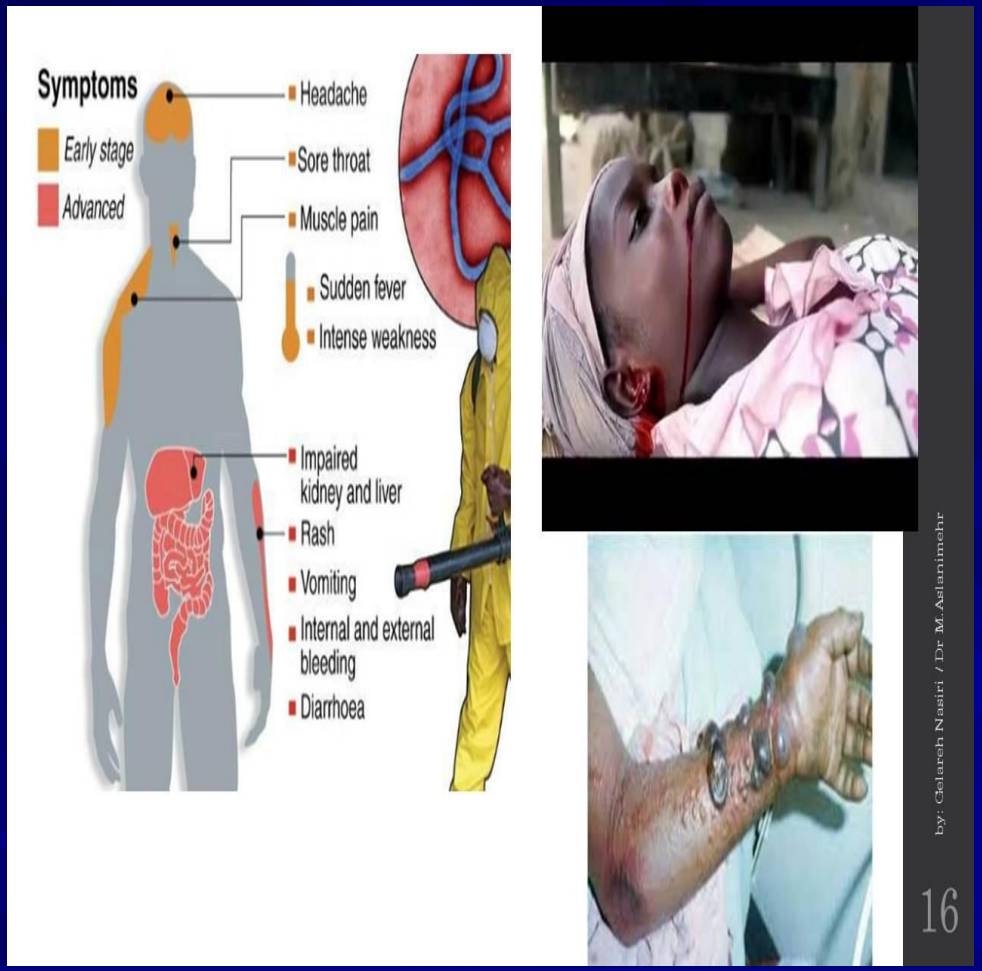
| Cause | Disease Examples |
|---|---|
| Ecological changes | Argentine hemorrhagic fever<br>Bolivian hemorrhagic fever<br>Hantavirus pulmonary syndrome<br>Korean hemorrhagic fever<br>Lassa fever<br>Lyme disease<br>Rift Valley fever<br>West Nile fever in the United States |
| Changes in human demographics or behaviors | Hepatitis B and C<br>Human immunodeficiency virus (HIV) disease<br>Tuberculosis |
| International travel and commerce | Cholera<br>Encephalitis<br>Severe acute respiratory syndrome |
| Technology | *Escherichia coli* hemolytic uremic syndrome<br>Hepatitides B and C<br>HIV disease<br>Legionnaires disease<br>*Salmonella* food poisoning |
| Microbial changes | Infections with antibiotic-resistant strains<br>Influenza |
| Breakdown in public health measures | Cryptosporidiosis<br>Diphtheria |

# You Need Study Viruses & Virology Because :

- Your job is high risk for acquired infection. especially blood borne and aerosol borne acquired infection .
- You Needs know and used infection control methods and inactivation of viruses.
- You MUST know about the viral infection : diagnosis, transmission , pathogenesis, prevention and treatment of viral infection.

# You Need Study Viruses & Virology Because :

- You Needs Diagnose viral infection or Diseases and choose appropriate treatment.
- Possibility of cross infection for clinicians & Patients and lab personals and acquired nosocomial viral infection ( Health care infection HCR) or laboratory acquired infection .
- You must Know manifestation of viral infection


Symptoms
Early stage
Advanced
Headache
Sore throat
Muscle pain
Sudden fever
Intense weakness
Impaired kidney and liver
Rash
Vomiting
Internal and external bleeding
Diarrhoea
by: Gelareh Nasiri / Dr M.Aslanimehr
16

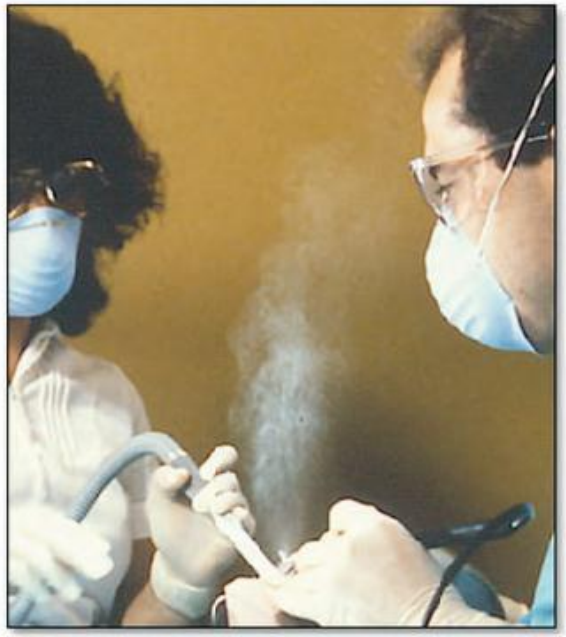
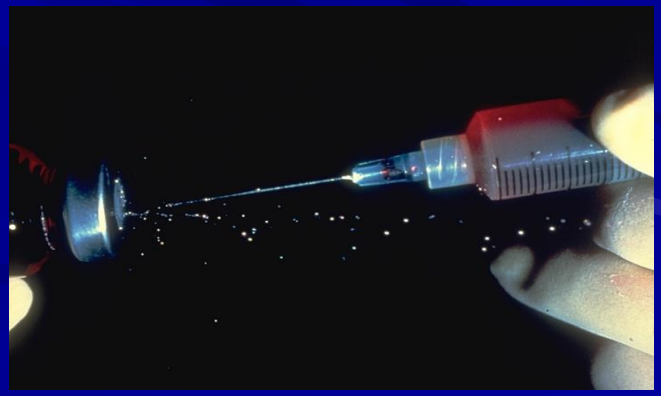


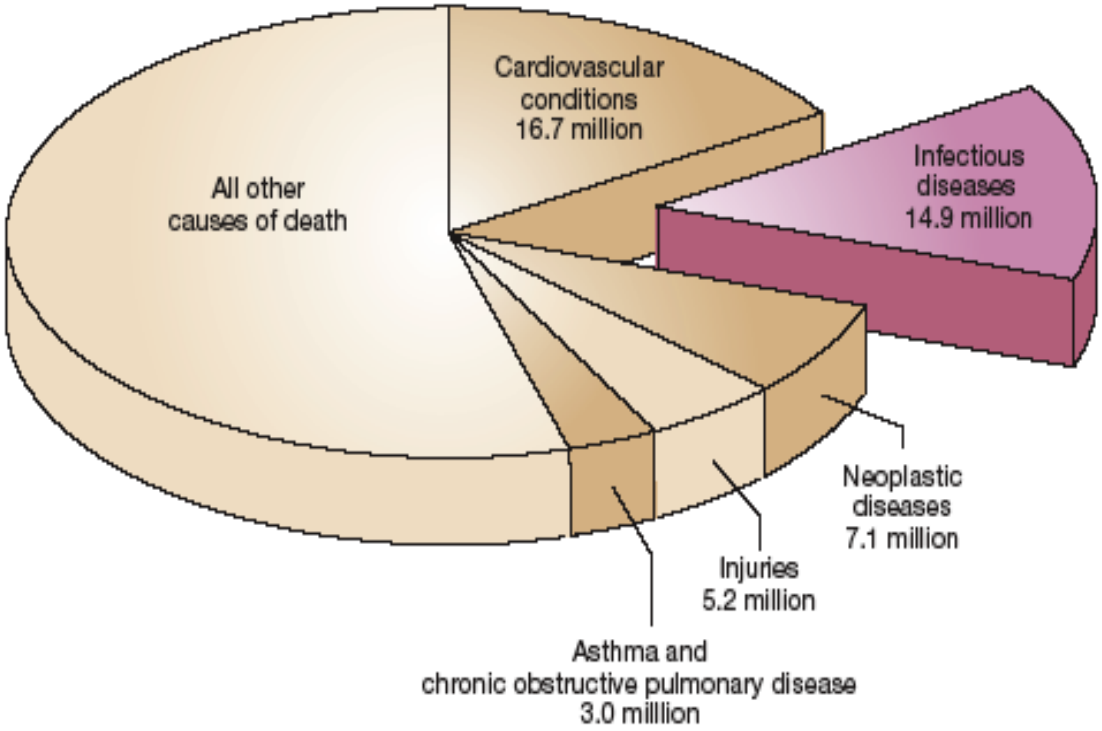
**Figure 4.** While high-speed and ultrasonic dental instrumentation clearly generate droplet nuclei, there is a paucity of data linking dental instrumentation to the generation of droplet nuclei containing MBT.



# Viral Infection

- More than 2000 species of viruses have been described, with approximately 650 infecting humans and animals.
- Infection can lead either to rapid replication and destruction of the cell or to a long-term chronic relationship
- Thus the diseases caused by viruses can range
  - from the common cold to gastroenteritis to
  - fatal catastrophes such as rabies, Ebola, smallpox,
  - or infection with the human immunodeficiency virus, the etiologic agent of the acquired immunodeficiency syndrome (AIDS),

# Leading causes of death worldwide

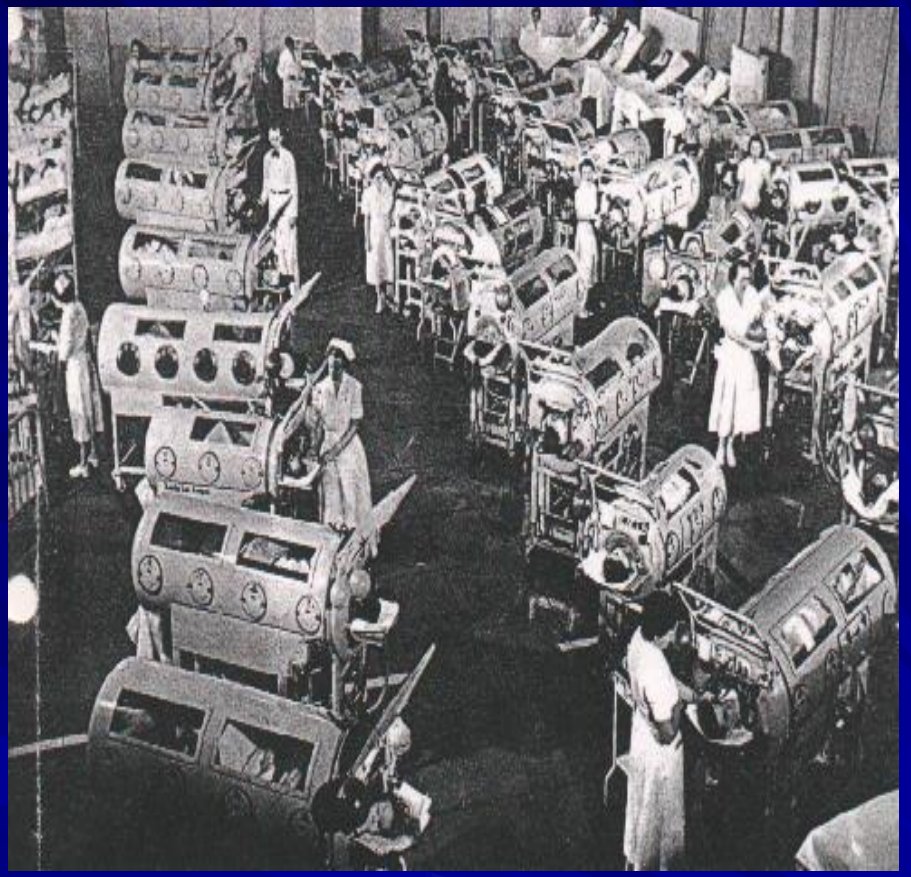



| Infectious diseases | Annual deaths (million) |
|---|---|
| Respiratory infections | 3.96 |
| HIV/AIDS | 2.77 |
| Diarrhoeal diseases | 1.80 |
| Tuberculosis | 1.56 |
| Vaccine-preventable childhood diseases | 1.12 |
| Malaria | 1.27 |
| STDs (other than HIV) | 0.18 |
| Meningitis | 0.17 |
| Hepatitis B and C | 0.16 |
| Tropical parasitic diseases | 0.13 |
| Dengue | 0.02 |
| Other infectious diseases | 1.76 |

**Figure 2** Leading causes of death worldwide. About 15 million (>25%) of 57 million annual deaths worldwide are the direct result of infectious disease. Figures published by the World Health Organization (see http://www.who.int/whr/en and ref. 7).

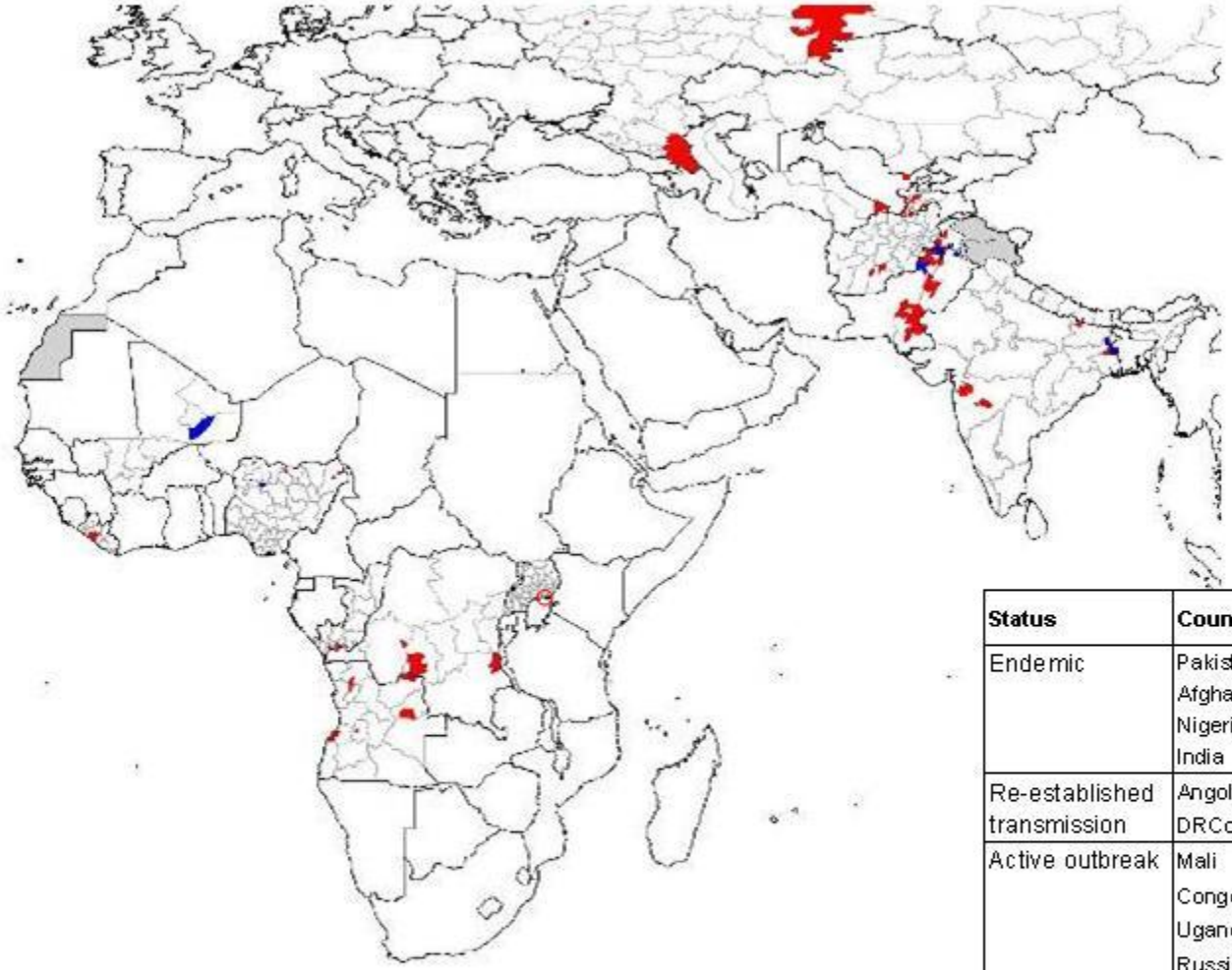
# Epidemiology of viral Infection from past to today

**FIGURE 52–5.** Child with smallpox. Note the characteristic rash.



# Iron lung ward in the 1950's

# Wild Poliovirus infected districts[1,2], 24 May – 23 Nov 2010



**District infected with wild polio virus type 1**

**District infected with wild polio virus type 3**

**District infected with more than one type of wild poliovirus**

| Status | Country | Date of most recent type 1 | Date of most recent type 3 |
|---|---|---|---|
| Endemic | Pakistan | 25-Oct-10 | 28-Oct-10 |
| | Afghanistan | 11-Oct-10 | NA |
| | Nigeria | 09-Oct-10 | 05-Oct-10 |
| | India | 21-Sep-10 | 31-Aug-10 |
| Re-established transmission | Angola | 13-Oct-10 | NA |
| | DRCongo | 10-Oct-10 | NA |
| Active outbreak | Mali | NA | 17-Sep-10 |
| | Congo | 11-Oct-10 | NA |
| | Uganda | 28-Sep-10 | NA |
| | Russian Federation | 25-Sep-10 | NA |
| | Liberia | 08-Sep-10 | NA |
| | Nepal | 30-Aug-10 | NA |
| | Kazakhstan | 12-Aug-10 | NA |
| | Tajikistan | 04-Jul-10 | NA |
| | Turkmenistan | 28-Jun-10 | NA |

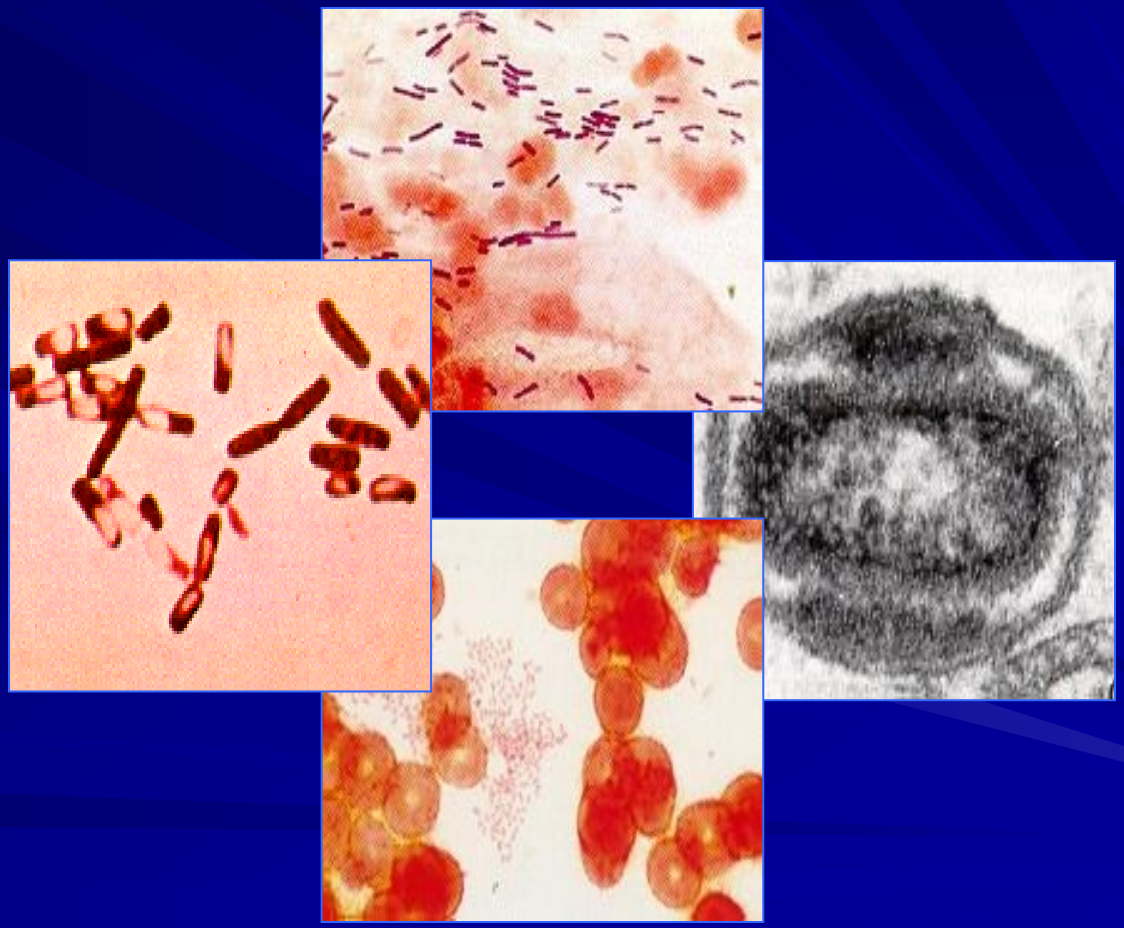
NA. Date of onset is prior to rolling 6-month period

[1]Excludes viruses detected from environmental surveillance and vaccine derived polioviruses. [2]Of the poliovirus cases reported from the Russian Federation, some may be attributed to other countries following full investigation.

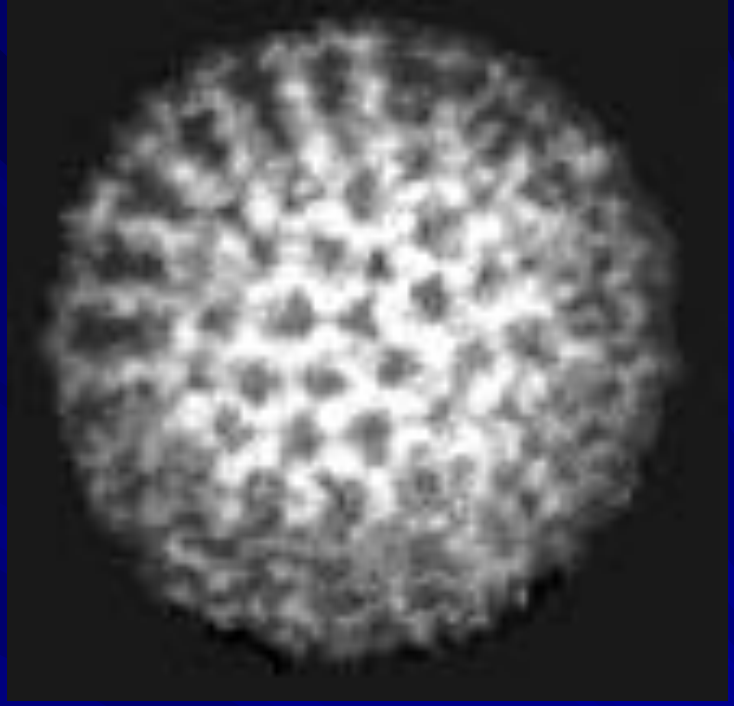
Data in WHO HQ as of 23 Nov 2010

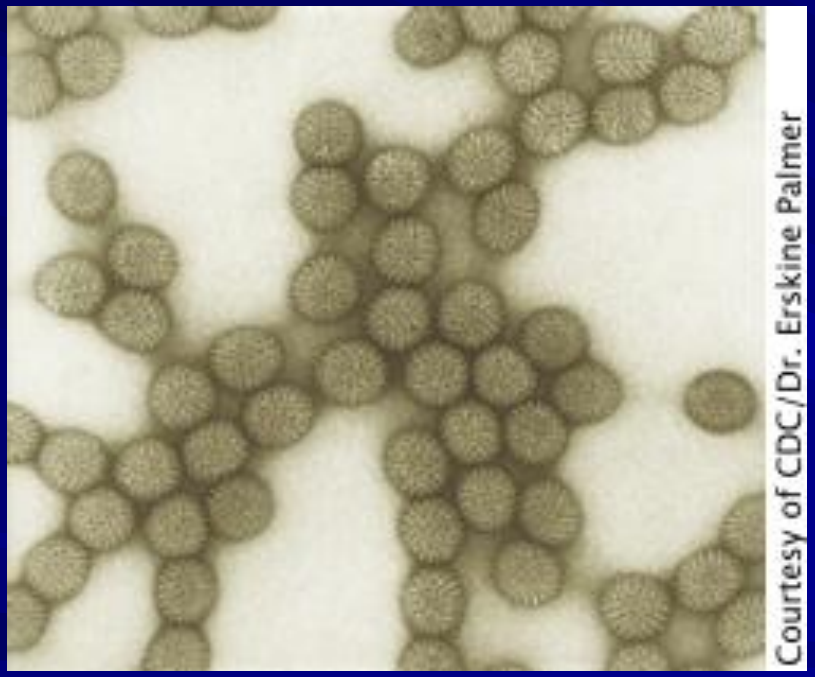
# Agents of Bioterrorism

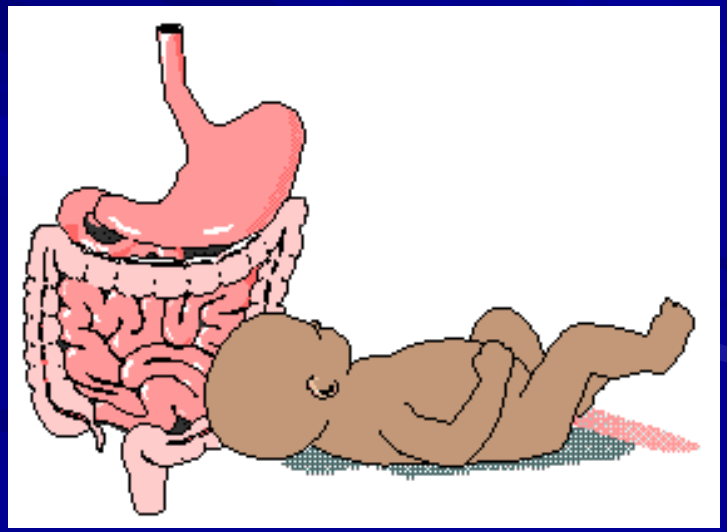
- Bacteria
- Viruses
- Toxins

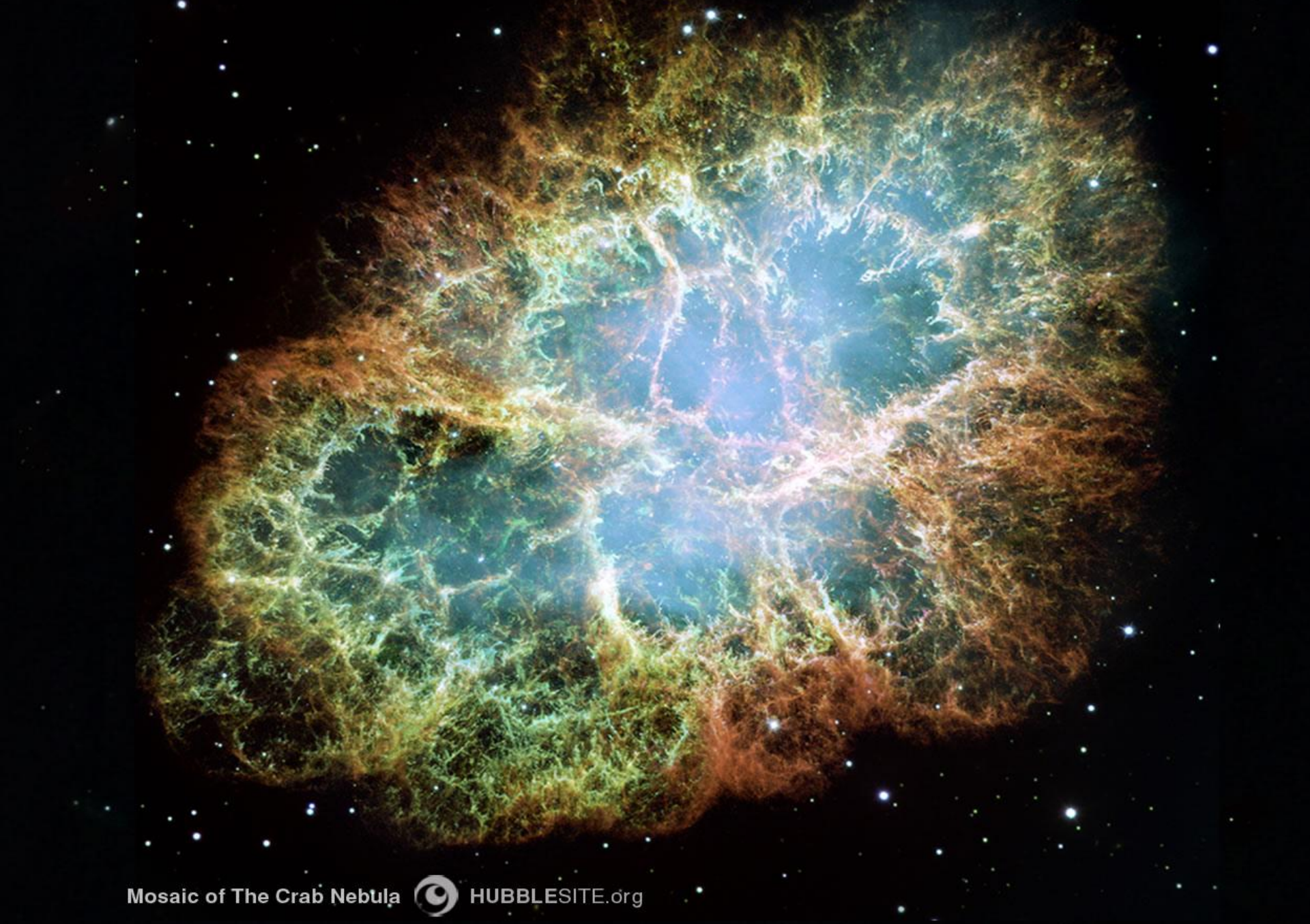


# Rotaviruses






Mosaic of The Crab Nebula
HUBBLESITE.org

# AIDS patients

New Emergence Diseases

# AIDS patients


# IRAN (ISLAMIC REPUBLIC OF)

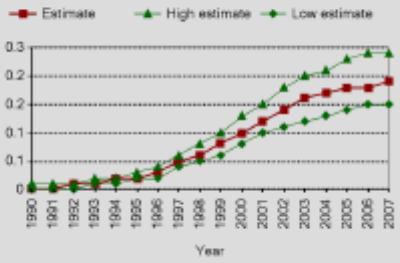
Epidemiological Country Profile on HIV and AIDS

World Health Organization

UNAIDS

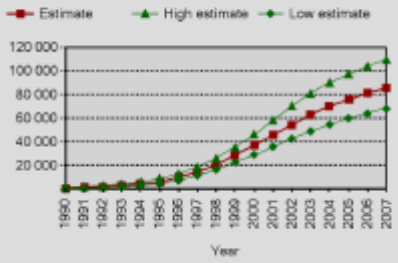
## Epidemic estimates

Estimated adult HIV (15-49) prevalence %



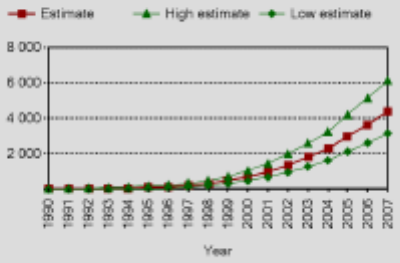

Source: UNAIDS/WHO, 2008

Number of people living with HIV




Source: UNAIDS/WHO, 2008

Annual number of AIDS deaths




Source: UNAIDS/WHO, 2008

NO DATA AVAILABLE

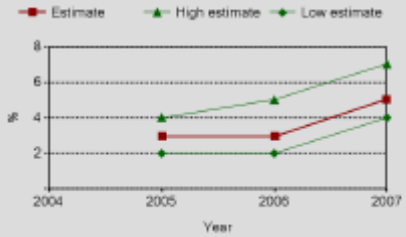
Urban and rural adult (15-49) HIV prevalence (%)

| Year | Urban | Rural |
|---|---|---|
| | | |

Source: See sources above in map.

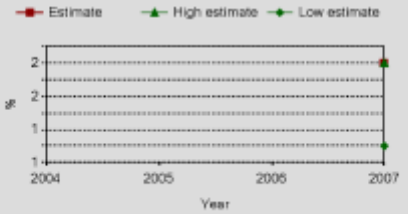
## Coverage estimates (%)

Estimated antiretroviral therapy coverage (%)




Source: UNAIDS/WHO, 2008

Estimated percentage of pregnant women living with HIV who received antitretrovirals for preventing mother-to-child transmission




Source: UNAIDS/UNICEF/WHO, 2008

## Trends in behaviours

Source:

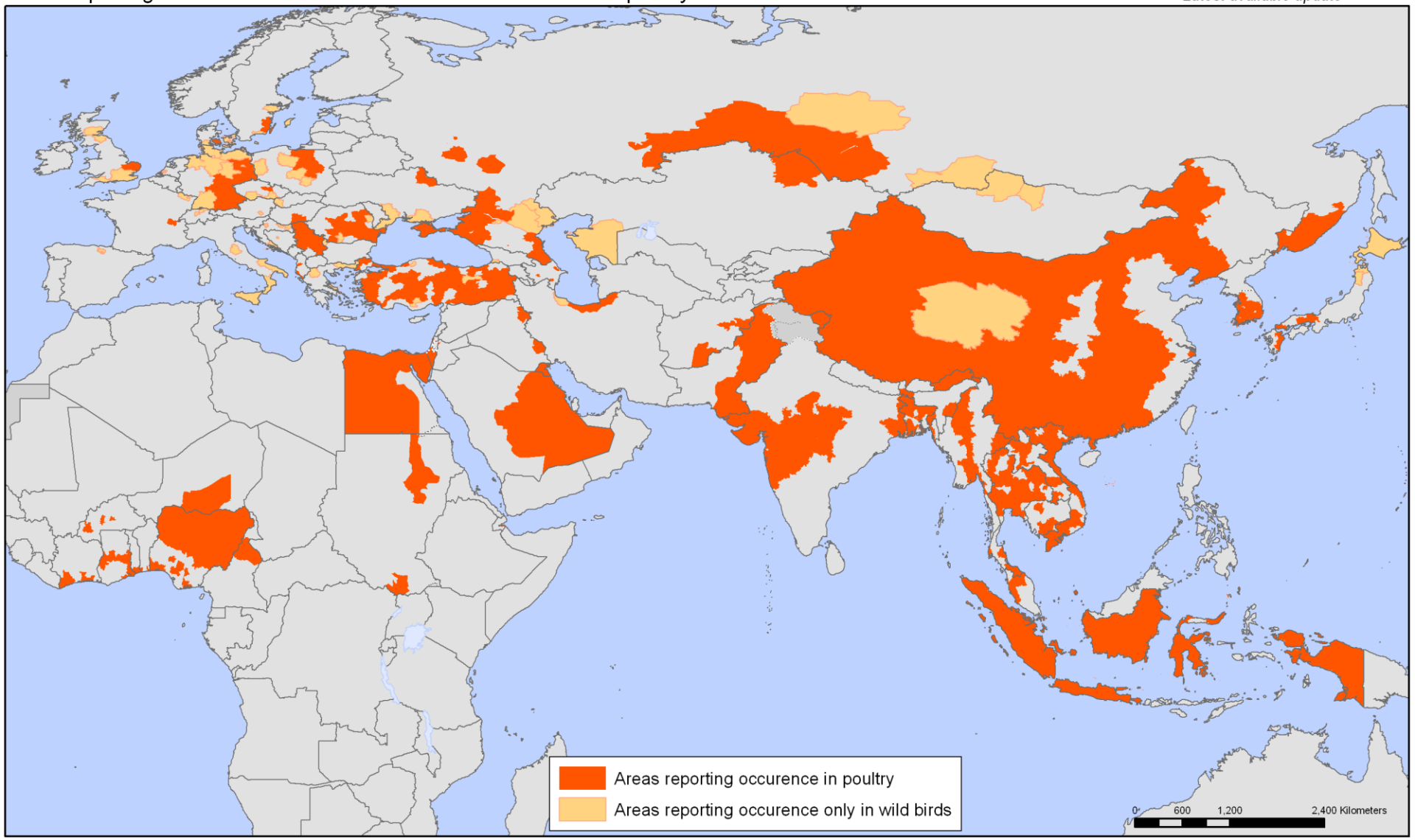
Source:

➢ Figure 21.17 **Swine flu.** During the height of the great flu pandemic of 1918, the gymnasium of Iowa State University was temporarily converted into a hospital ward.

# Avian Influenza

Areas reporting confirmed occurrence of H5N1 avian influenza in poultry and wild birds since 2003

*Status as of 23 September 2008*
*Latest available update*




World Health Organization

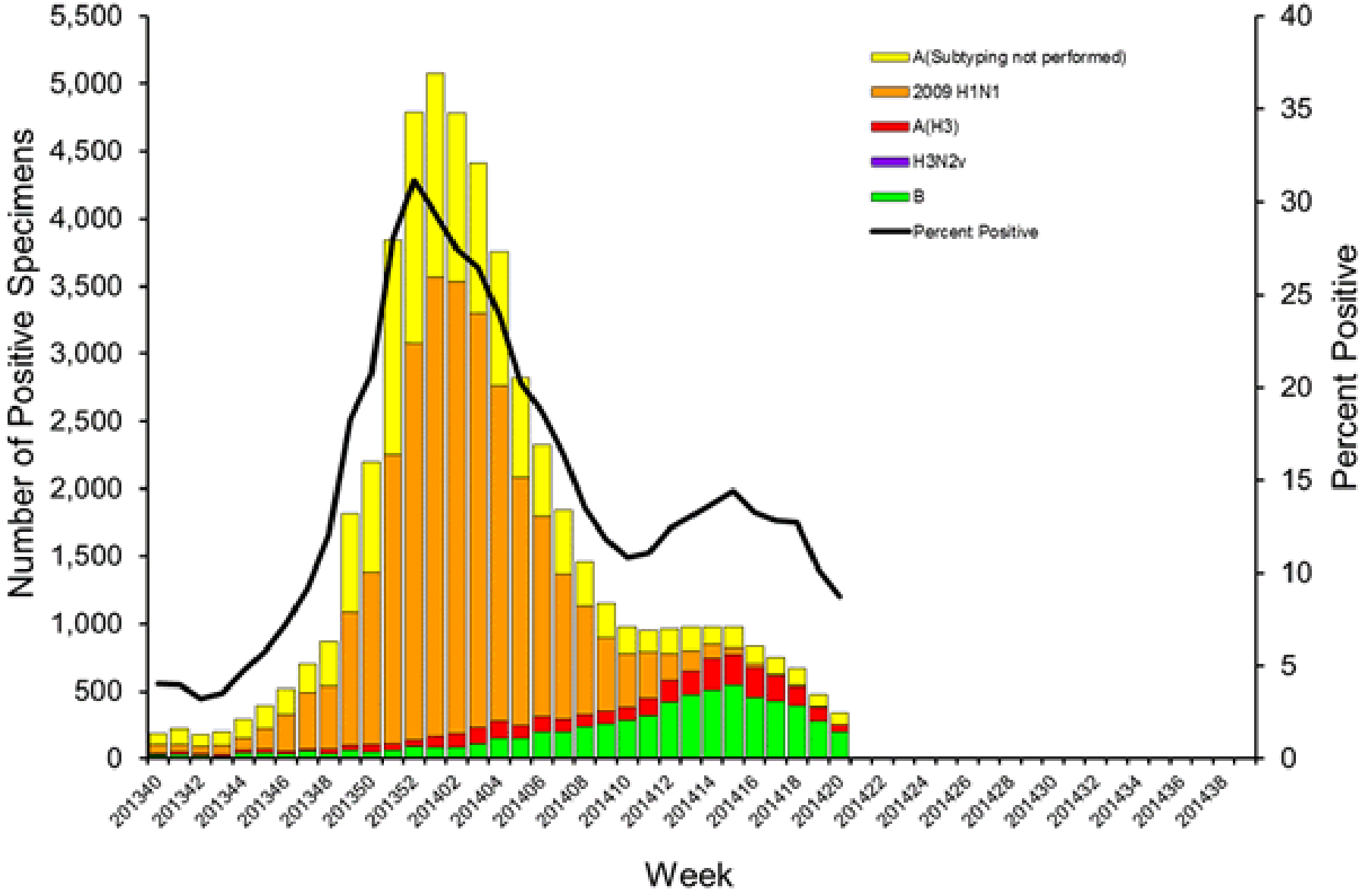


The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

**Data Source: World Organisation for Animal Health (OIE) and national governments**

Map Production: Public Health Information and Geographic Information Systems (GIS), World Health Organization

# Influenza Positive Tests Reported to CDC by U.S. WHO/NREVSS Collaborating Laboratories, National Summary, 2013-14



# Distribution of Hepatitis B

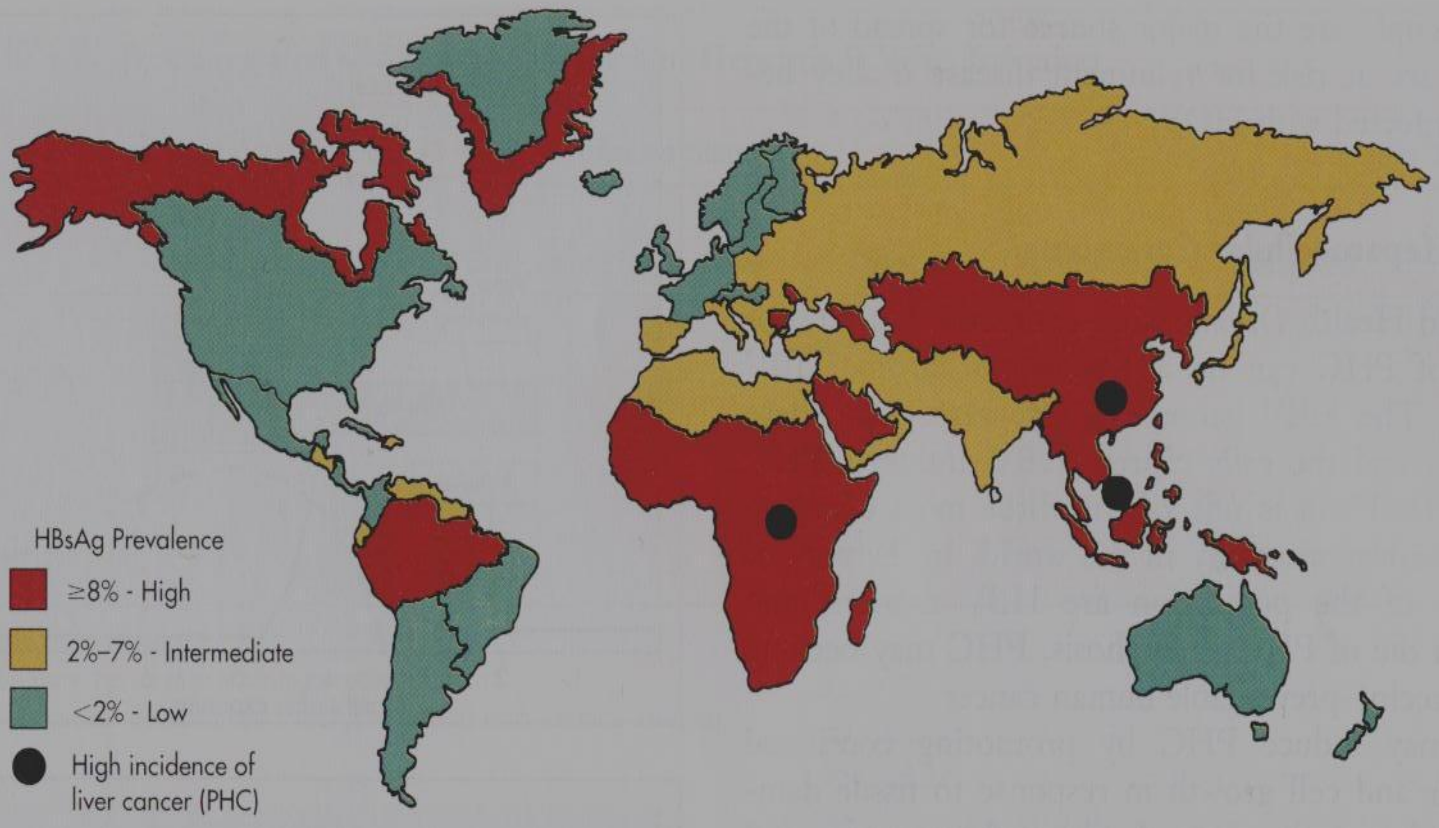
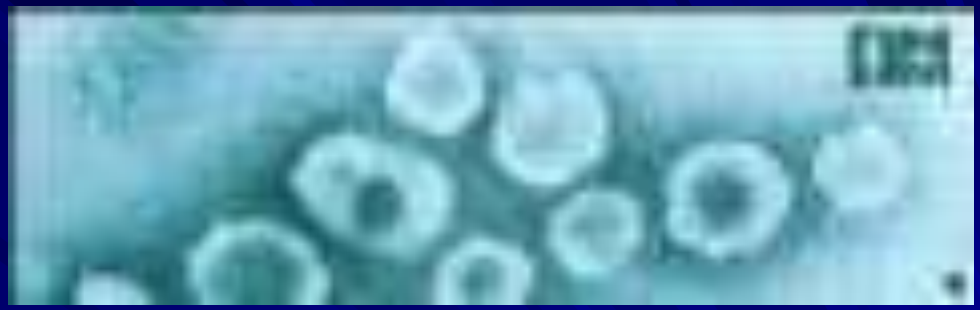
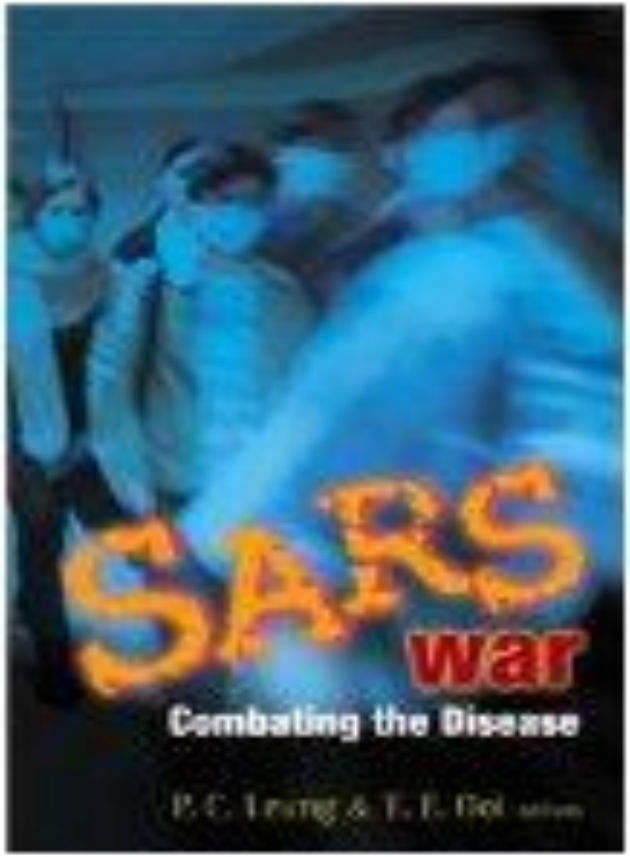



**FIGURE 62–9.** Worldwide prevalence of hepatitis B carriers and primary hepatocellular carcinoma. (Courtesy Centers for Disease Control and Prevention, Atlanta.)

# SARS & MERS






# Out break of Marburg Hemorrhagic Fever in africa 2007

# Viruses in last years

# Ebola Virus


Lagos
JUSTICE AND PROGRESS

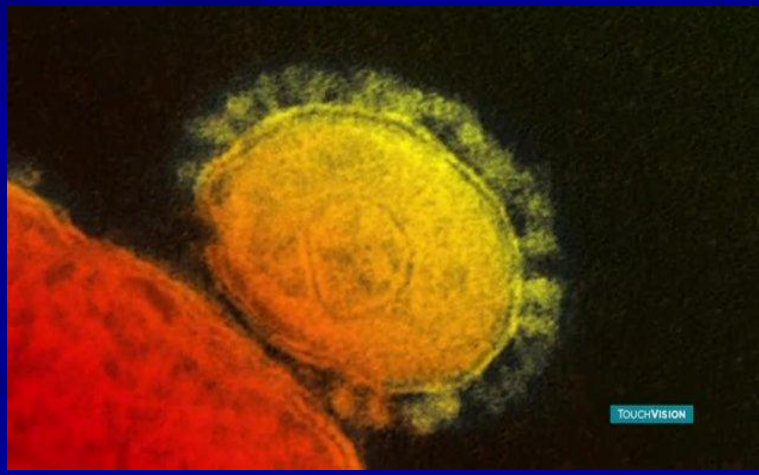

پروفسور پردیس ثابتی
سرپرست پژوهشهای علمی ویروس ابولا در آمریکا
PERSIAN GULF FOREVER


STOP
PERSONAL
PROTECTIVE

# MERS in Sought Korea 2015

# H7N9 avian Influenza China

# MERS related Virus



# MERS in South Korea

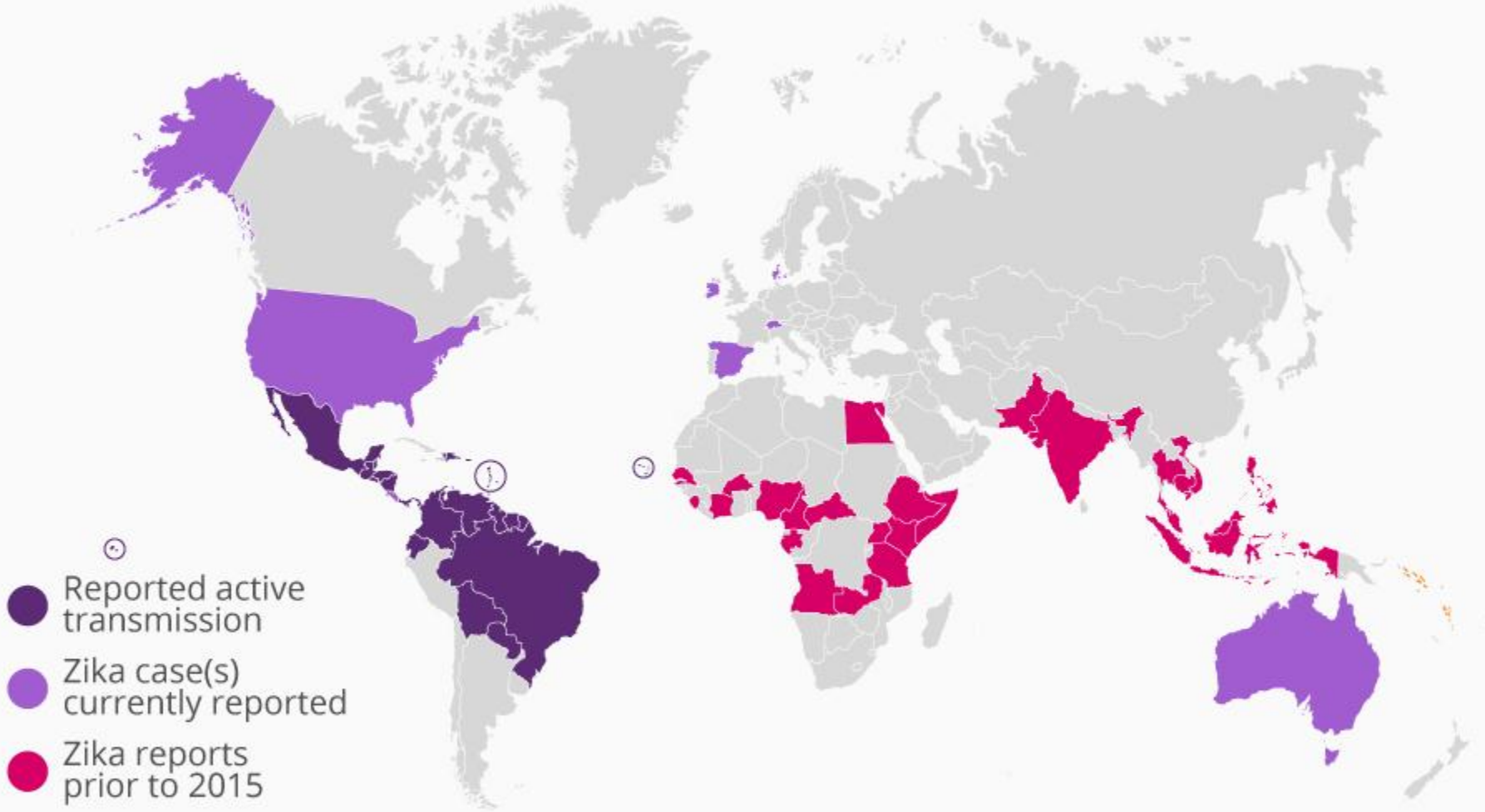
# Nature of Viral Infection

# Viruses

- Viral infections range from very mild and self-limiting to life-threatening.
- Many viruses are strictly human in origin, others are zoonoses, some transmitted by vectors.
- Most DNA & a few RNA viruses can become permanent resident of the host cell.
- Several viruses can cross the placenta & cause developmental problems.

# The Spread Of The Zika Virus

Countries and territories with active Zika virus transmission* and reported cases




@Statista_com

Source: Centers for Disease Control and Prevention
*As of February 2016

statista

# Viral Chronic Infection

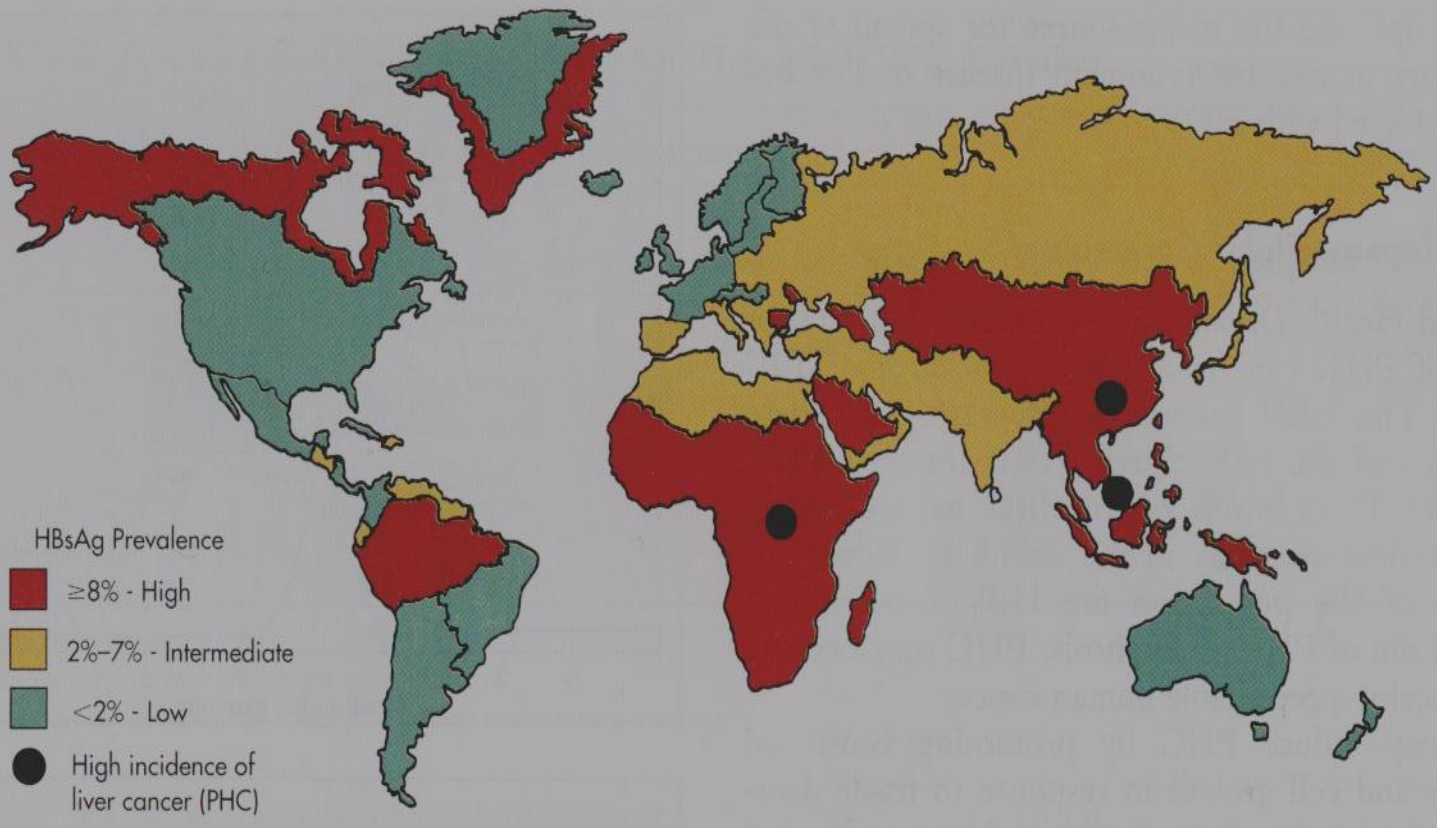
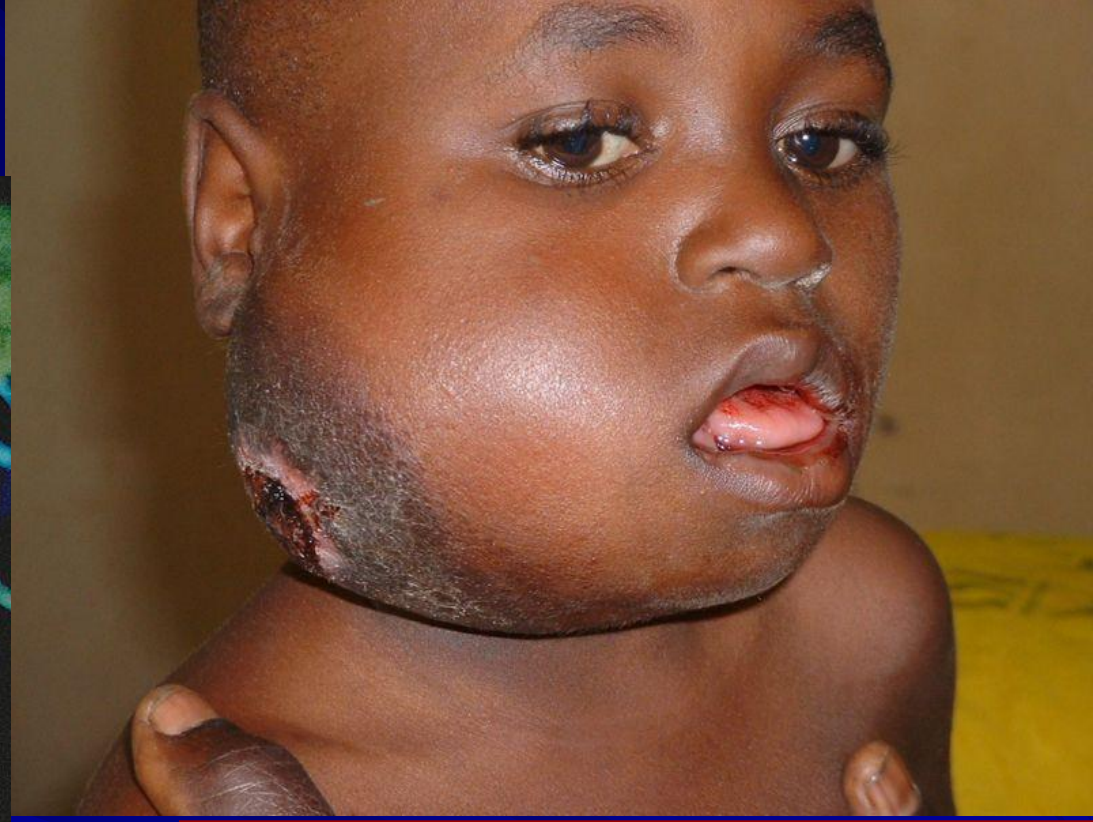



**FIGURE 62–9.** Worldwide prevalence of hepatitis B carriers and primary hepatocellular carcinoma. (Courtesy Centers for Disease Control and Prevention, Atlanta.)



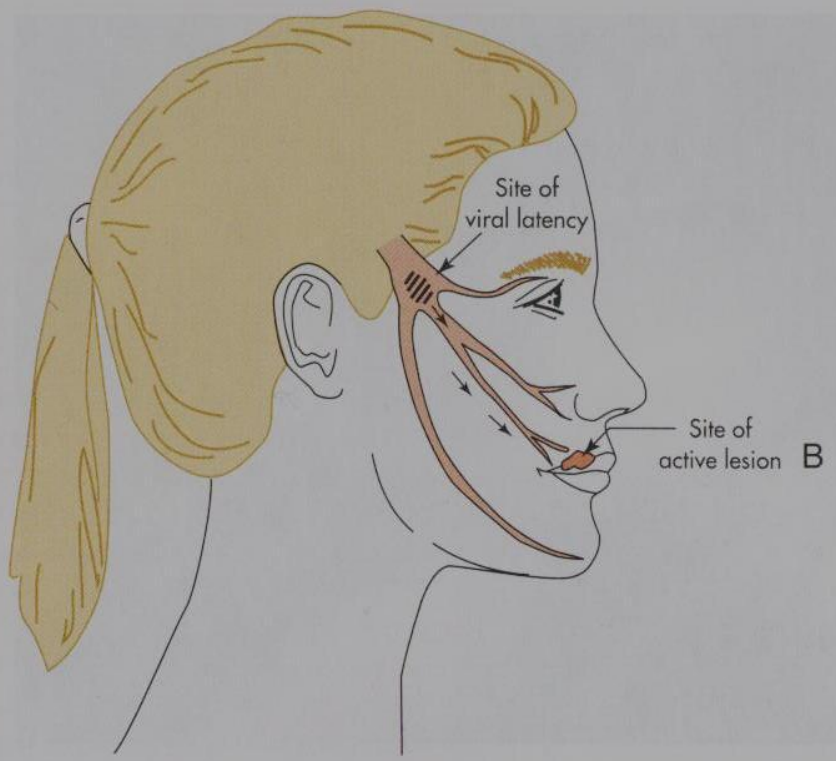
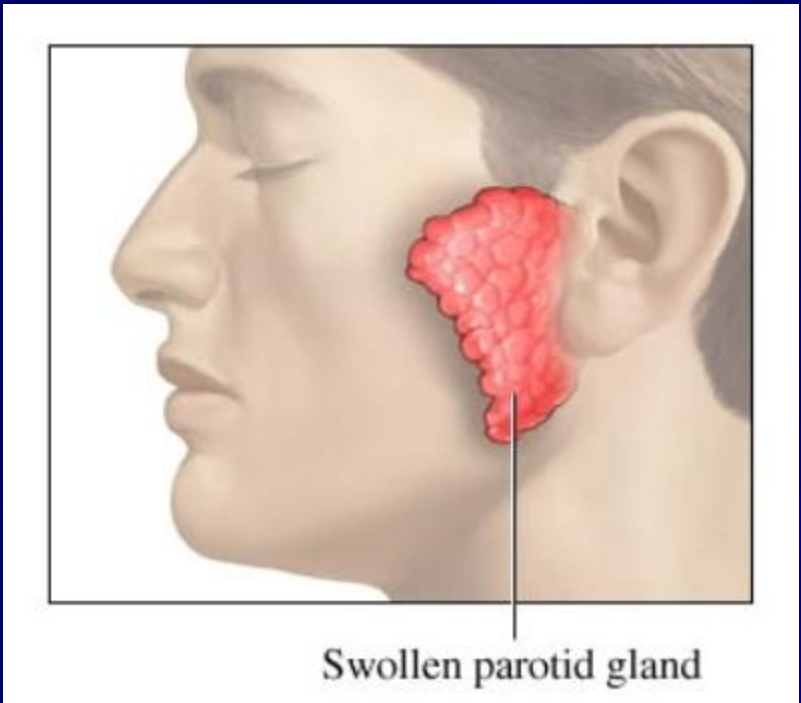




**FIGURE 51–5.** *A,* Primary herpes gingivostomatitis. *B,* Herpes simplex virus establishes latent infection and can recur from the trigeminal ganglia. (*A* from Hart CA, Broadhead RL: *A color atlas of pediatric infectious diseases,* London, 1992, Wolfe; *B* modified from Straus SE: Herpes simplex virus and its relatives. In Schaechter M, Eisenstein BI, Medoff G, editors: *Mechanisms of microbial disease,* ed 2, Baltimore, 1993, Williams & Wilkins.)

# Acute infection Mumps




# Rubella

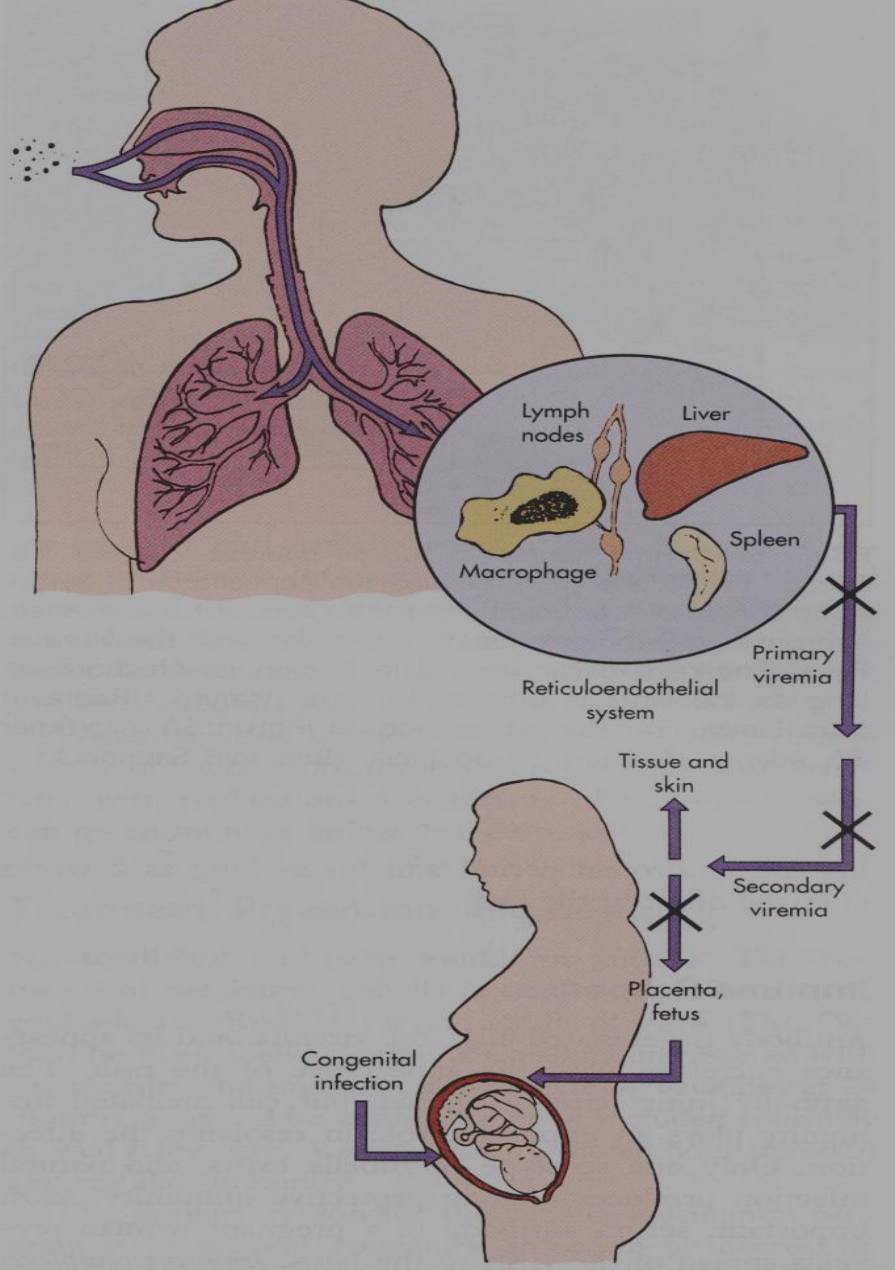
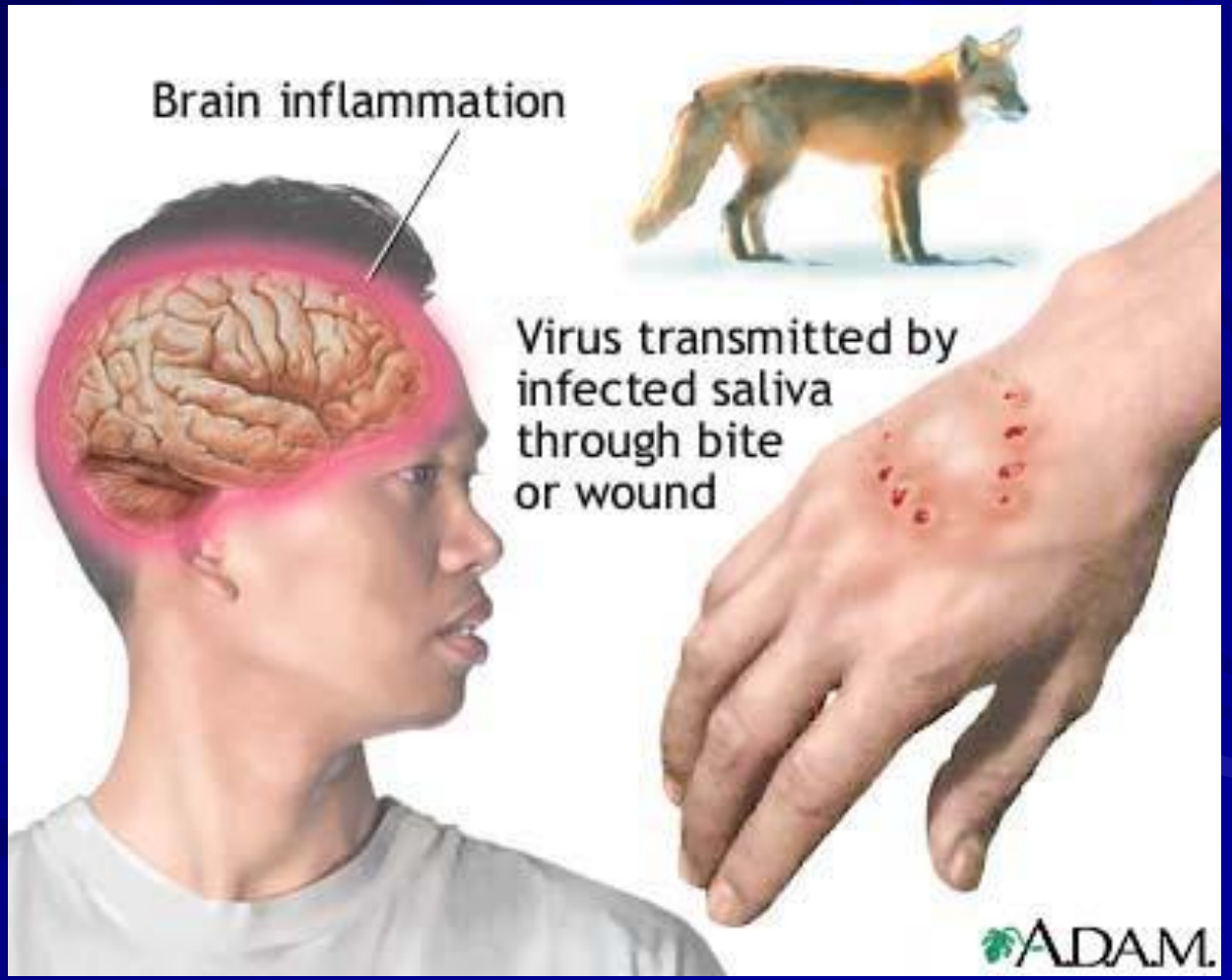



**FIGURE 59–6.** Spread of rubella virus within the host. Rubella enters and infects the nasopharynx and lung and then spreads to the lymph nodes and monocyte-macrophage system. The resulting viremia spreads the virus to other tissues and the skin. Circulating antibody can block


Spiral Galaxy NGC 3370
HUBBLESITE.org

# Rabies


Brain inflammation
Virus transmitted by infected saliva through bite or wound
A.D.A.M.


با یاد آنکه آسمان
را سقفمان و

زمین را در وقفمان
قرار داد

# همیشه رفتن رسیدن نیست .

ولی برای رسیدن، باید رفت.

در بن بست هم راه آسمان باز است .

پس پرواز بیاموز.

دکتر علی شریعتی